24.0 NORTHERN CALIFORNIA STEELHEAD ESU

24.1 BACKGROUND

24.1.1 Description of the ESU

The Northern California Steelhead Evolutionarily Significant Unit (ESU) includes coastal basins from Redwood Creek (Humboldt County) southward to the Gualala River (Mendocino County), inclusive (Busby *et al.* 1996). Life histories represented in the ESU include the winter- and summer-run and half-pounders (BRT 2003). Also included in the ESU are the artificially propagated steelhead stocks (and their progeny) at the Yager Creek Hatchery and the North Fork Gualala River Hatchery/Gualala River Steelhead Project (GRSP) Kingfisher Flat Hatchery (BRT 2003). The Mad River Hatchery stock is not included in the ESU

24.1.2 Current Status of the ESU

The Northern California Steelhead (NC) ESU was listed as a threatened species on June 7, 2000 (65 FR 36074), due to the depressed numbers of naturally-produced steelhead, and a number of significant impacts from environmental and human-caused threats to the species, including hatchery production and practices, degraded habitat resulting from commercial timber harvest actions, recreational fishing, poor land use practices, catastrophic flooding, predation, and the lack of adequate regulatory protection to conserve the ESU. The 1996 status review also cited Mathews Dam on the Mad River and Scott Dam on the Eel River as major barriers to historical habitat (Busby *et al.*1996). Population information collected on the Eel River at Cape Horn indicated a moderate decline short- and long-term abundance trends; pre-1965 data from Sweasy Dam on the Mad River also profiled a steelhead decline (BRT, 2003). Small increases were reported for steelhead in the Eel River, but the run remained well below the pre-1960s estimates. A population index has been established in the Wheatfield Fork reach in the South Fork of the Gualala River; the 2002 survey recorded 377 adult steelhead and 145 redds. In 1998, NOAA Fisheries signed a Memorandum of Agreement (MOA) with the California Department of Fish and Game (CDFG) to undertake a number of conservative measures to improve the short- and long-term trends of the NCS ESU. The measures dealt with fish harvest, hatcheries, monitoring and adaptive management, and the development of a watershed protection program. With the exception of changes of harvest regulations, most recommendations are in various stages of implementation, and will require some time for remedial effects to occur. Assessments by the West Coast Salmon Biological Review Team (BRT) of the risks faced by the ESU were divided, with 74 percent of the votes being cast in the “likely to be endangered”, 11 percent casting their vote for the “in danger of extinction” category, and the remaining 14 percent voting in the “neither” category (BRT, 2003b). The BRT believed that artificial propagation contributed to population abundance, but they were unsure of hatchery effects on the unknown productivity, spatial structure, and diversity of the ESU.

24.2 ASSESSMENT OF THE HATCHERY PROGRAMS

Noted populations that are within the boundaries of the ESU include the basin populations of the Mad, Eel, Van Duzen, Mattole, Ten Mile, Noyo, Big, Navarro, Garcia, and Gualala Rivers; the Redwood and Freshwater Creeks; and other Humboldt County and Mendocino County streams (BRT 2003). In addition, the artificially propagated steelhead stocks at the Yager Creek Hatchery and the North Fork Gualala River Hatchery/Gualala River Steelhead Project (GRSP) Kingfisher Flat Hatchery are part of the ESU (BRT 2003). The Mad River Hatchery stock is not included in the ESU. The following section presents a summary of the broodstock/program history, similarity between hatchery origin and natural origin fish, program design, and program performance of these artificial propagation programs (Table 24.1).

Table 24.1. Artificial Propagation Programs which release steelhead within the geographical area of the NCS ESU.

Program	Type	Included in ESU	Description	Production Level	Year Initiated
Yager Creek Hatchery Pacific Lumber Company	integrated	yes	yearling smolt	5,000	1972
N.F. Gualala River Hatchery/ Gualala River Steelhead Project	integrated	yes	all year classes	rescue/rearing 15,000	1981
Mad River Hatchery	integrated	no	yearling smolt	250,000	1970

24.2.1 Yager Creek Populations

There are no population estimates available for Yager Creek (SSHAG 2003). In 1993, 4,600 juvenile steelhead from Freshwater Creek Hatchery were planted into the Yager Creek Basin (Busby *et al.* 1996).

24.2.1.1 Yager Creek Hatchery Steelhead Program

24.2.1.1.1 Program History. The Pacific Lumber Company (PALCO) began a fish rearing program in 1972 for the purpose of restoring salmonid populations in Yager Creek and its tributaries. Initially, fish were trapped in Yager Creek, raised in concrete tanks, and released into tributaries of the Eel River. In 1976, the first hatchery and rearing facility was built; it was reconstructed as a state of the art rearing facility in 1997, and promoted aquatic education. PALCO operated this facility and three satellite rearing facilities until recently. Over 9,700 steelhead smolt of the 1996 broodyear were released in the Yager Creek Basin in 1997, and 4,600 Freshwater Creek juvenile steelhead were released in the Yager Creek Basin in 1993 (Bryant 1998). Program performance was monitored by snorkel and spawning surveys and out-migration trapping (CDFG 2002).

As of the 2002/2003 spawning season, the Yager Creek Hatchery steelhead program is no longer in operation, and there are no current plans to re-start hatchery operations in the near future (J. Ayers, CDFG, (*pers. comm.*).

24.2.1.1.2 Broodstock History. Broodstock was collected from Yager Creek and juveniles were released in the Van Duzen River basin (SSHAG 2003). An average of 21 adults were annually trapped and an average of 5 females spawned for the program (SSHAG 2003). In broodyear 1989, 20,040 steelhead from the Mad River Hatchery program were reared and released in Yager Creek. It is unknown if the out-of-basin stock has introgressed with the native population; there is no genetic data for the Yager Creek Hatchery program (SSHAG 2003).

24.2.1.1.3 Similarity of Hatchery Origin to Natural Origin Fish. All hatchery stock was taken from the wild population, and progeny was 100 percent adipose-clipped prior to release in the Van Duzen River basin.

24.2.1.1.4 Program Design. The Yager Creek program released marked juveniles propagated only from natural broodstock collected on-site, for purposes of restoring Val Duzen River system steelhead. The program had previously released out-of-basin steelhead into Yager Creek, but there is no genetic data available to make a determination of genetic impact to the native stock.

24.2.1.1.5 Program Performance. Recent egg take for the steelhead program is summarized as follows: 8,450 eggs for a 1996/97 release of 5,520 yearling smolts; 26,520 eggs for a 1997/98 yearling smolt release of 5,190; 13,243 eggs for a 1998/99 of 4,204 yearling smolts; and 3,900 eggs for a 1999/00 yearling smolt release of 2,973 (CDFG 2002). Corresponding egg-to-yearling survival was 65.3%, 19.6%, 31.7%, and 76.2%. There is no corresponding information for adult returns to evaluate program performance. The steelhead program was discontinued with the 2000 yearling smolt releases.

24.2.1.1.6 Effect on VSP

Abundance - Hatchery effects on abundance are not known

Productivity - Hatchery effects on productivity are not known

Spatial structure - There has been no evidence of an expansion of population spatial structure.

Diversity - Yager Creek Hatchery spawned only natural (unclipped) fish, but did not incorporate grilse into the program. Hatchery effects on population diversity are not known.

24.2.2 Gualala Steelhead Populations

There are no abundance estimates for the Gualala steelhead populations.

24.2.2.1 Gualala River Steelhead Project Program

24.2.2.1.1 Program History. The GRSP is a non-profit organization staffed by volunteers. The

steelhead program began as a traditional fish hatchery (1979-1989), and later evolved into a hatchbox rearing program. GRSP also expanded their operations with a rescue and rearing program. Steelhead juveniles are rescued from dewatering pools and riffles after the mouth to the North Fork Gualala River breaches. Fish are left in their natural habitat as long as possible before they are removed by hand dip nets and transported to pools at the Rescue Rearing Center. They remain there until enough rain has fallen to re-water their natal streams (CDFG, 2002). Rearing facilities are located in Doty Creek, a tributary to the North Fork Gualala River, and rescued steelhead are returned to the creek. In the spring of 1995, the program planted 3,500 North Fork Gualala River stock steelhead into Doty Creek. In 1997, 4,200 rescued steelhead were planted in the creek (Bryant, 1998).

The Gualala River Steelhead Project has recently terminated the hatchbox rearing program, involving artificial propagation, to concentrate on the rescue rearing program and restorations efforts in the Gualala River (J. Ayers, CDFG, *pers. comm*.).

24.2.2.1.2 Broodstock History. Broodstock were collected from the native stock, and only non-clipped steelhead were utilized in the hatchbox rearing program. An average of 3,740 fingerlings had been released in years 1989-95; 1998; and 2000.

24.2.2.1.3 Similarity of Hatchery Origin to Natural Origin Fish. The previous hatchery production was F1 generation. Hatchery adult returns were not incorporated into the broodstock. Genetically, the GRSP steelhead were identical to the natural origin fish. Hatchery fish exhibit the same run- and spawn-timing of the natural population.

24.2.2.1.4 Program Design. The Gualala River steelhead program carries out fish rescues of juvenile steelhead from the North Fork Gualala River, and rear the fish at a facility until significant rainfall (2 - 2.5 inches) occurs. Fish are then released into natal streams. The goal is restoration of Gualala River steelhead. Up to 19,000 juveniles steelhead have been rescued for summer rearing; fish survival has ranged from 31 to 73 percent during the 1999 - 2002 interval. Steelhead redd surveys carried out in some reaches of the Gualala River in 2001 and 2002 indicated steelhead presence and spawning success. There are no abundance estimates for the Gualala River, and it is unknown if the program has contributed to the productivity of the natural population.

24.2.2.1.5 Program Performance. The program is successful in carrying out it's rescue mission.

24.2.2.1.6 Effect on VSP

Abundance - There is currently no abundance information on steelhead populations in the North Fork Gualala River, and it is unknown if previous GRSP artificial propagation efforts contributed to population productivity. The GRSP rescue actions of stranded steelhead have provided opportunity for increased abundance of the population. The program rescued 7,255 steelhead juveniles in 2001, of which 5,998 were successfully released into the Gualala River.

Productivity - It is unknown if previous GRSP artificial propagation efforts have contributed to population productivity. There had been no monitoring or evaluation of the program. Gualala River Hatchery rescue and rearing program benefits productivity by salvaging steelhead that would be lost from natural population. In some seasons, rescued fish may comprise a substantial component of returns for a year class.

Spatial structure - It is unknown if previous GRSP artificial propagation efforts have contributed to spatial structure. There had been no monitoring or evaluation of the program nor evidence of expansion of population spatial structure.

Diversity - Previous GRSP artificial propagation efforts did not likely affected population diversity, due to the small scale of hatchery operations.

24.3 CONCLUSIONS

24.4 LITERATURE CITED

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